
MEASUREMENT OF DIFFERENTIAL THICK TARGET NEUTRON YIELDS (TTY) FROM Fe, Cu(p,n) REACTIONS AT 35, 50 AND 70 MeV

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Differential thick target neutron yields (TTY) data are required for the design of accelerator shielding and the accelerator-based neutron sources. Data are required to be obtained with high energy resolution over wide energy range and range. In the present experiments, we obtained the TTY data for the ^{nat}Fe , $^{nat}\text{Cu}(p, xn)$ reaction at 35, 50 and 70 MeV. These elements are very popular element for beam-lines and beam-dumps in accelerators. Therefore, it is important to know secondary neutron spectra these elements bombarded by accelerated charged particles. The experiment was carried out as apart of the TTY series of measurements using a time-of-flight (TOF) technique at the Cyclotron and Radioisotope Center, Tohoku University (CYRIC) with the K=110 AVF cyclotron and the beam-swinging system. Data were obtained by using two gain detectors with different flight path length (3.5m and 11.0 m) to cover almost entire range of secondary neutrons at several laboratory angles between 0- and 110-deg. Neutron detectors were NE213 detectors and the bias for low energy measurements was ~ 0.5 MeV. Neutron events were separated from gamma-ray events by the pulse-shape-discrimination (PSD) technique, and its efficiency was obtained with the Monte Carlo code SCINFUL-R. The data obtained were corrected for the attenuation by air and the target.

The results were compared with other experiment and the LA-150 data library. The data for copper at 70 MeV are in good agreement with those by Meigo, but show marked disagreement with LA-150 in higher energy range. This tendency is similar to other heavy nucleus such as tungsten and tantalum which were measured before by us. We are planning to do measurements for thin target to clarify the difference.